



Carbon footprint of the Danish electricity transmission and distribution systems

Turconi, Roberto; Astrup, Thomas Fruergaard

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Turconi, R., & Astrup, T. F. (2013). *Carbon footprint of the Danish electricity transmission and distribution systems*. Abstract from 5th International Conference on Carbon Accounting (ICARB), Edinburgh, United Kingdom.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Carbon footprint of the Danish electricity transmission and distribution systems

Roberto Turconi* and Thomas Astrup

Department of Environmental Engineering, Technical University of Denmark

*robt@env.dtu.dk, +45 4525 1591

The electricity sector is among the main sources of greenhouse gas (GHG) emissions; today, those are mainly due to combustion of fossil fuels, but with increasing renewable sources the importance of infrastructures both in electricity generation and in transmission and distribution (T&D) will likely grow. Several studies are available on renewable energy technologies, but only a few on transmission of electricity, and none on its distribution. This study provides life cycle inventory data for electricity distribution networks, and a life cycle GHG accounting of the Danish T&D networks.

The purpose was to evaluate the potential importance of environmental impacts associated with T&D in current and future electricity systems. Including the emissions from electricity T&D is needed to provide a full carbon footprint of electricity systems, and is essential to properly assess the environmental consequences of potential changes in an electricity system. So far, the basis for such assessments has not been available.

The functional unit of this study was the delivery of one kWh of electricity in Denmark. The 2010 Danish electricity T&D networks were modeled, including power lines, transformers, and relevant auxiliary infrastructures.

Electricity T&D provided respectively 29 and 17 gCO₂e/kWh, mainly related to power losses. Emissions from distribution were larger than those from transmission, because of higher losses and higher complexity and material consumption. Large differences were found between overhead and underground lines (i.e. for 50 kV lines, 3.2 and 17 kgCO₂e/km respectively)

A new specific dataset for infrastructures in the distribution network was provided and used to evaluate the role of electricity distribution in Denmark. Both T&D provided non-negligible emissions. In the future, due to more renewables and decentralized electricity generation, emissions from T&D may become significant compared to electricity generation itself. Consequently, it is recommended that emission from electricity T&D are included in relevant GHG studies.